US Army Corps of Engineers®
Portland District

VANCOUVER TO THE DALLES
FEDERAL NAVIGATION CHANNEL
BONNEVILLE DAM
Navigation Lock 2
Downstream Entrance Shoal
Multnomah County, Oregon

SEDIMENT QUALITY EVALUATION REPORT

29 July 2022
(Sampled 22 March 2022)

Prepared by:
U.S. Army Corps of Engineers - Portland District
Sediment Quality Team
(CENWP-ODN-W)

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TABLES AND FIGURES

Cover Image: Bonneville Dam, Columbia River (Corps Hydrosurvey, September 2021)

ACRONYMS AND ABBREVIATIONS

ARI	Analytical Resources Inc.
ALS	ALS Environmental
ASTM	American Society for Testing and Materials
Corps	U.S. Army Corps of Engineers, Portland District
CRD	Columbia River Datum
CY	Cubic yards
EPA	U.S. Environmental Protection Agency
FNC	Federal Navigation Channel
LOD	Limit of Detection
MDL	Method Detection Limit
MRL	Method Reporting Limit
NL2	Navigation Lock 2
ODEQ	Oregon Department of Environmental Quality
PAH	Polynuclear aromatic hydrocarbons
PCB	Polychlorinated biphenyl
PSEP	Puget Sound Estuary Program
PSET	Portland Sediment Evaluation Team
QA/QC	Quality Assurance/Quality Control
RM	River Mile
SAP	Sampling and Analysis Plan
SEF	*Sediment Evaluation Framework for the Pacific Northwest*
SL	Screening level
SLV	Screening level value
SQER	Sediment Quality Evaluation Report
SVOC	Semi-volatile organic compounds
TOC	Total organic carbon
TPH	Total petroleum hydrocarbons
VTD	Vancouver to the Dalles
WECY	Washington Department of Ecology

PRODUCT PREPARATION AND QUALITY ASSURANCE STATEMENT

This sediment quality evaluation report (SQER) was prepared in accordance with procedures and policies found in the May 2018 *Sediment Evaluation Framework for the Pacific Northwest* (SEF).

This report was prepared by Samantha Lynch with technical review by James Holm (Sediment Quality Team). Additionally, the Portland Sediment Evaluation Team (PSET) has reviewed this report for consistency with the SEF guidance. The PSET consists of the U.S. Army Corps of Engineers-Portland District (Corps), U.S. Environmental Protection Agency (EPA), National Marine Fisheries Service, U.S. Fish and Wildlife Service, Oregon Department of Environmental Quality (ODEQ), and Washington Department of Ecology (WECY) personnel. Internal comments, and comments from external agencies, have been incorporated into this final report.

1.0 PROJECT DESCRIPTION, SITE HISTORY AND ASSESSMENT

1.1 PROJECT LOCATION AND DESCRIPTION

Bonneville Lock and Dam is located at river mile (RM) 146 of the Columbia River in the states of Oregon and Washington. The dam fully spans the river and is approximately 40 miles upstream of Portland, Oregon near the town of Cascade Locks, Oregon. The dam provides hydropower, fish facilities, and has two navigation locks.

A shoal has formed in the Vancouver to the Dalles (VTD) federal navigation channel (FNC) since 2018 at the downstream end of the Bonneville Dam Navigation Lock 2 (NL2), located southwest of Robins Island (Figure 1). Another shoal is forming outside the channel north of the NL2 shoal. The VTD FNC is 300 feet wide and authorized to -27 feet Columbia River Datum (CRD), but only maintained to -17 feet plus 2 feet of overdredge. The estimated dredge volume is approximately 2,500 cubic yards (CY) to a dredge depth of -19 feet CRD. The sampling and analyses will inform if the shoals are natural or anthropogenic in nature, future management decisions, dredging, and in-water suitability of dredged material.

1.2 CURRENT PROJECT CONDITIONS

The 9 September 2021 hydrographic survey of the VTD FNC (Figure 1) indicates a shoal has formed at the downstream end of the Bonneville Dam NL2, located southwest of Robins Island. Another shoal is forming outside the channel north of the NL2 shoal.

2.0 PROJECT PLANNING AND COORDINATION

2.1 DATA GOALS

The sediment characterization goals for the NL2 downstream channel include the following:

- Collect, handle, and analyze representative sediment from the federal channel in accordance with protocols and quality assurance/quality control (QA/QC) requirements.

- Characterize the NL2 downstream channel sediments (~2,500 CY per shoal) in accordance with the regional dredge material testing protocols found in the 2018 SEF (RSET 2018) for unconfined aquatic placement and unconfined aquatic exposure. A second shoal area outside of the VTD channel was also sampled and characterized.
- Analyze samples for physical and conventional parameters with contingency chemical analyses per the 2018 SEF.
- Determine the suitability of the downstream NL2 shoal materials for unconfined, aquatic disposal per the 2018 SEF.

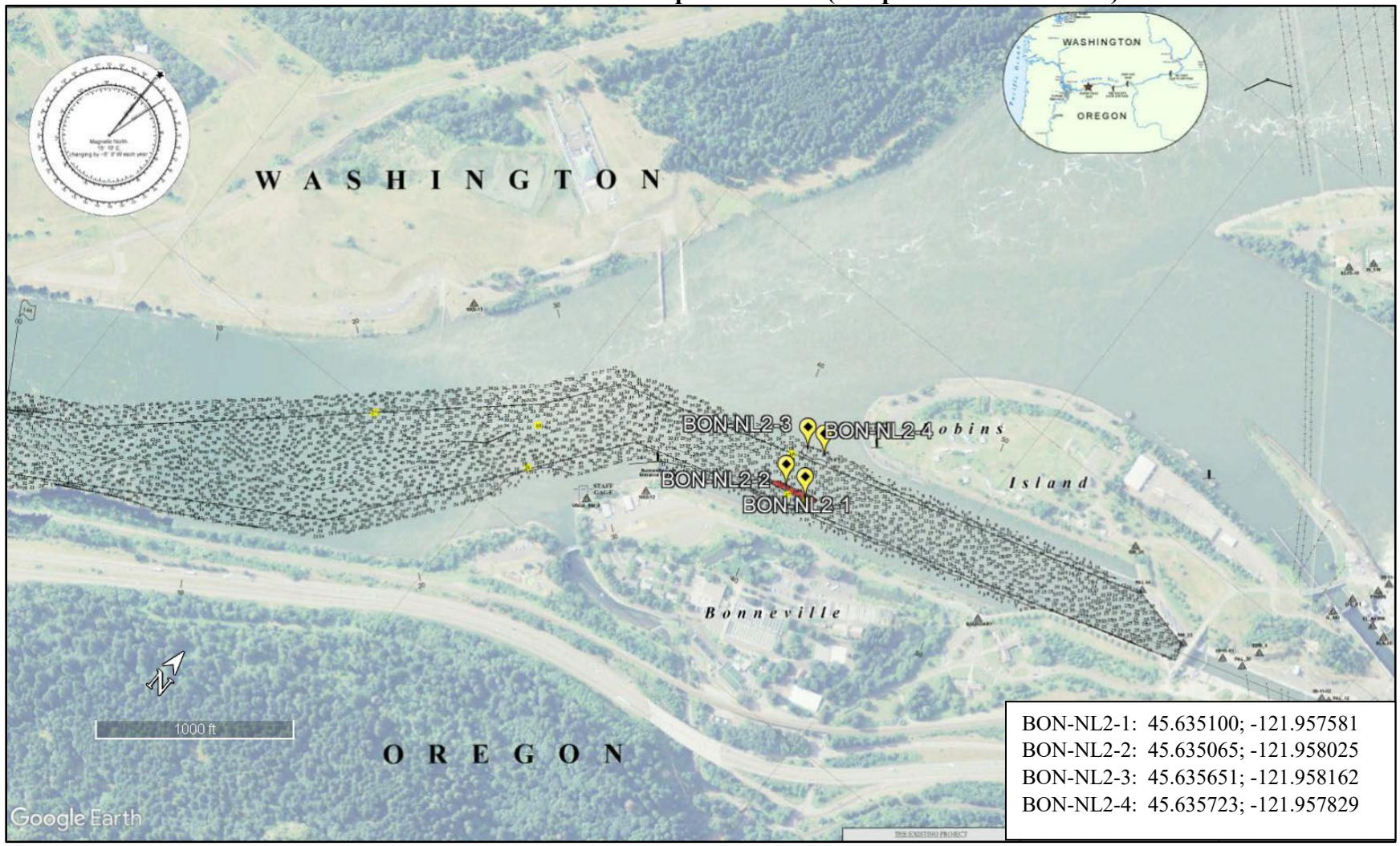
2.2 PLANNING TEAM AND RESPONSIBILITIES

Table 2 lists the Project Team, their duties and responsibilities for the sediment-sampling at the VTD FNC NL2 project.

Table 1. BON NL2: Sediment Characterization, Planning Team and Responsibilities

Task/Responsibility	James Holm (Corps)	Dominic Yballe (Corps)	Samantha Lynch (Corps)	Survey Section (Corps)	Contract Laboratory
SAP Preparation		X	X		
SAP Technical Review	X				
Agency Coordination	X	X	X		
Sediment Sampling	X	X	X	X	
Laboratory Analysis					X
SQER Preparation			X		
SQER Technical Review	X				

FIGURE 1. NL2 shoal in the VTD channel: 2022 actual sample locations (sampled 22 March 2022)



3.0 SAMPLING AND ANALYSIS REQUIREMENTS

3.1 PROJECT RANKING

The project was preliminary ranked "Low" by the Corps based on previous sampling from surrounding areas and because the site is situated in an area of high energy flows in the Columbia River.

3.2 SAMPLING DEVICE SELECTION

Two 2-point composite samples were proposed in the SAP for the areas displayed in Figure 1. The Corps used a PONAR grab sampler to collect surface sediment samples.

4.0 SEDIMENT SAMPLING NARRATIVE

4.1 SAMPLING LOCATIONS

Two 2-point dredge prism composite samples were collected for DMMUs "BON-NL2-COMP-1" and "BON-NL2-COMP-2". Table 2 shows the actual sample locations and the tide-corrected mudline elevation in CRD. The dredge prisms were analyzed for conventional and chemical parameters. Photos of the four sampling stations are shown in Figure 2. Archived subsamples, if collected, and the composite sample were labeled using the following convention, respectively:

20220304-BON-NL2-"X" or "COMP-Y"

Where 2022 represents the year, 03 the month, and 22 the day (i.e. March 22, 2022); "BON-NL2" denotes samples collected from Bonneville Dam Navigation Lock 2; "X" denotes the sample station IDs (1-4); or "COMP" indicates composite sample and "Y" denotes the DMMU ID ("1" inside the federal channel; and "2" outside the Federal channel). The date identifier will be omitted for brevity on the jar labels. Table 2 shows the location of the sample stations and tide-corrected sample depths.

Table 2. BON NL2 channel: DMMU, stations, sample IDs, locations and depths

Station ID	DMMU/Sample ID	Latitude (°N)	Longitude (°W)	Water Depth (ft)	Tide Reading (ft. CRD)	Mudline Elevation (ft. CRD)
BON-NL2-1	BON-NL2-COMP-1	45.635100	-121.957581	22.0	-7	-15.0
BON-NL2-2		45.635065	-121.958025	23.3 to 24.8	-7 to -7.2	-16.3 to -17.6
BON-NL2-3	BON-NL2-COMP-2	45.635651	-121.958162	20.8	-7.2	-13.6
BON-NL2-4		45.635723	-121.957829	21.5	-7.2	-14.3

Corps staff verified post-sampling that all samples were collected from the dredging prism (mudline to -19.0 ft CRD), including the advanced maintenance dredging interval. No grab samples were collected below the dredge prism and all samples are representative of the dredge prism materials.

4.2 DECONTAMINATION AND SAMPLING PROCEDURES

All sampling devices and utensils were thoroughly cleaned prior to using at each station according to the following procedure:

- Rinsed with native water
- Washed with brush and phosphate-free soap (ex. Tergajet ©)
- Rinsed with distilled water

All handwork for chemical analyses were conducted with disposable nitrile gloves that were rinsed with distilled water before handling each individual sample, as appropriate, to prevent sample contamination. Gloves were disposed of between samples to prevent cross contamination.

Grab samples were collected from the BON NL2 shoals with a PONAR grab sampler. The sampling methods follow those outlined in Section 3.2 of the PSET-approved SAP. The sampling device was lowered and raised by hand from the side of the vessel. Excess water was allowed to drain through the top screen of the sampler prior to placing the sampler in the tray and opening the sampler jaws. Each sample was inspected for acceptability (winnowing, leakage, or overfill) prior to placing in a stainless steel pan. Attempts were noted on the grab sample log (Attachment A).

4.3 FIELD NOTES AND SAMPLING/ANALYSIS SCHEME

Field notes and grab sample field forms appear in Attachment A. During the sampling event, field notes were maintained by the Corps. Field notes included the following information:

- Project Name
- Date and time of collection of each sediment sample
- Names and organizations of the person(s) collecting and logging in the samples
- Weather and water surface conditions at start and end of sampling event
- Depth of each station sampled as measured from the water surface using leadline or depth recorder
- Gauge Name and Vertical Datum of nearest gauge (provided by the Corps Hydrosurvey vessel provided a tide-corrected mudline elevation during sampling)
- Sample station number and individual designation numbers assigned for each individual sample
- Latitude and longitude of each sample
- Attempts and sample recovery
- Physical soil description (including soil type, density/consistency of soil, color)
- Odor (e.g. hydrogen sulfide, petroleum products)
- Visual stratification and lenses
- Vegetation
- Debris
- Biological activity (e.g. detritus, shells, tubes, bioturbation, live or dead organisms)
- Presence of oil sheen

- Any other distinguishing characteristics or features with photographs
- Any field deviation from SAP

The PSET-approved sampling and analytical approach for the NL2 downstream channel sediments are detailed in Table 3 below. Photographic examples of the NL2 downstream channel sampling event are documented in Figure 2.

TABLE 3. BON NL2: Sampling scheme and analytical approach

Sampling Description			
Sample collection method		Standard PONAR Grab	Standard PONAR Grab
DMMU ID		BON-NL2-COMP-1	BON-NL2-COMP-2
DMMU Rank		Low	Low
DP sample ID		BON-NL2-COMP-1	BON-NL2-COMP-2
PDS sample ID		NA	NA
Proposed DMMU volume (CY)		2,500	2,500
Dredge Prism	Depth range (ft CRD)	-15 to -17.6	-13.6 to -14.3
	Composite (Y/N)	Y	Y
	Subsamples (SS)/DMMU	2	2
	SS Archive (Y/N)	N	N
PDS Layer	Depth range (ft CRD)	N/A	N/A
	Composite (Y/N)	N/A	N/A
	SS/PDS-layer	N/A	N/A
	SS Archive (Y/N)	N/A	N/A
Sediment Physical and Chemical Analysis (No. DP/ No. PDS)			
Grain size		1/-	1/-
Total organic carbon		1/-	1/-
Total solids		1/-	1/-
Metals, freshwater		1/-	1/-
Total PAHs		1/-	1/-
Semi volatile organic compounds (phthalates, phenols, misc. extractables)		1/-	1/-
Pesticides		1/-	1/-
Polychlorinated Biphenyls (Total Aroclors)		1/-	1/-
Butyltins		1/-	1/-
Total petroleum hydrocarbons (dx, rx)		1/-	1/-

FIGURE 2. BON NL2: Subsample and composite sample photographs (sampled 22 March 2022)

4.5 SAMPLE TRANSPORT AND CHAIN-OF-CUSTODY

After each sample container was filled, it was sufficiently padded and packed with wet ice in a cooler. Chain-of-custody procedures were implemented and maintained in custody by the Corps maintained until delivered to the contract laboratories Analytical Resources, Inc. (ARI) and ALS Environmental (ALS). Sample holding times and storage requirements are presented in Table 4. Specific procedures were as follows:

- Samples were packaged and hand-delivered directly to ARI and ALS within 24 hours of obtaining samples.
- Individual sample containers were packed to prevent breakage.
- The coolers were clearly labeled with sufficient information (name of project, time and date container was sealed, person sealing the cooler and office name and address) to enable positive identification.
- Chain-of-custody forms were enclosed in a plastic bag and placed inside the coolers. Upon transfer of sample possession to the laboratory, the persons transferring custody of the coolers signed the chain-of-custody form. Upon receipt of samples at the laboratory, the coolers were inspected and their condition of the samples recorded. Refer to Attachment B.
- All samples were received by ARI and ALS in good condition and at the appropriate holding temperature (Table 4).

Table 4. 2018 SEF Recommended Sample Volume and Storage

Sample Type	Holding Time	Sample Size (a)	Temperature (b)	Container
Particle Size	6 months	100-200 g	4±2°C	1, 1 gallon freezer bag
Total Organic Carbon (TOC)/ Total Solids	14 days	125 g each	4±2°C	8-oz Glass
SVOCS (PAHs, Phenols, Phthalates, Misc. Extractables)	14 days	150 g	4±2°C	8-oz Glass
Mercury	28 days	50 g	4±2°C	4-oz Glass
Metals (except Mercury)	6 months	50 g	4±2°C	
Pesticides	14 days	150 g	4±2°C	8-oz Glass
PCBs	14 days	150 g	4±2°C	8-oz Glass
Total Petroleum Hydrocarbons	14 days	100 g	4±2°C	8-oz Glass
Butyltins	14 days	50 g	4±2°C	4-oz Glass

(a) – Recommended minimum field sample sizes for one laboratory analysis. Actual volumes to be collected have been increased to provide a margin of error and allow for retesting
(b) – During transport to the lab, samples will be stored on ice. Archived samples (1 L jar) will be frozen immediately upon receipt at the lab. Samples in jars to be frozen must include headspace to prevent breakage

4.6 DEVIATIONS FROM THE SAMPLING AND ANALYSIS PLAN

The following deviations from the PSET-approved SAP are identified:

A picture of the sample obtained from Station 2 and composite 2 were not taken due to sampler oversight. Sediment from Station 2 was brown fine sand with no odor. Station 2 sediment contained sticks, leaves, and *Corbicula* which were removed before processing.

Subsamples were not archived due to financial limitations.

5.0 LABORATORY ANALYSIS AND RESULTS

ALS conducted the physical and TOC analysis on the two BON NL2 composite samples. Physical analysis for all samples included grain size distribution according to modified ASTM D422 method.

ARI analyzed the two BON NL2 composite samples for total solids (PSEP 1986) and the following freshwater chemical analyses:

- Total Metals (arsenic [As], cadmium [Cd], chromium [Cr], copper [Cu], nickel [Ni], lead [Pb], selenium [Se], silver [Ag], and zinc [Zn]), by EPA method 6020A. Mercury [Hg] by EPA method 7471B
- Semi-volatile Organic Compounds (SVOC), by EPA method 8270D
    - PAHs
    - Phenols
    - Phthalates
    - Miscellaneous extractable compounds
- Organochlorine Pesticides, by EPA method 8081B
- PCB Aroclors, by EPA method 8082A
- TPH Diesel Range Organics, by method NWTPH-Dx
- TPH Residual Range Organics by method NWTPH-Rx
- Butyltins, by EPA 8270D

Laboratory testing activities were documented in written reports. The reports from the analytical laboratories included:

- Case narrative.
- Results of the laboratory analyses and QA/QC results.
- All protocols used during analyses.
- Chain of custody procedures.

The laboratory conventional and chemical parameters are summarized in Table 5. Detailed laboratory results are provided in the ALS and ARI laboratory reports. Electronic copies of ALS's and ARI's laboratory reports are available from the Corps upon request.

Final chains-of-custody are provided with the laboratory reports and in Attachment B. All physical analyses were performed by ALS, and the results met the QA/QC criteria specified in the SAP and SEF.

All chemical analyses were performed by ARI and are consistent with the QA/QC criteria specified in the SAP and SEF. The ARI lab report contains analytical results for samples designated for Tier II validation deliverables, including summary forms and all associated raw data for each analysis. When appropriate to the method, method blank results have been reported with each analytical test. The SEF-relevant excerpt for PCBs from the ARI case narrative is provided as follows:

PCB Aroclors - EPA Method SW8082A

The sample(s) were extracted and analyzed within the recommended holding times. Initial and continuing calibrations were within method requirements. The data was reported from the column that was in control. Internal standard areas were within limits. The surrogate percent recoveries were within control limits. The method blank(s) were clean at the reporting limits. The blank spike (BS/LCS) percent recoveries were within control limits. The SRM is in control.

Corps staff reviewed the laboratory data and QA reports to ensure that the data collected were of quality sufficient for the PSET to determine the suitability of the project sediments. Corps staff also cross-checked the laboratory data report with the electronic data deliverable to ensure that the correct results were reported to the PSET. Data will be uploaded to WECY's Environmental Information Management database.

The sediments sampled were composed of 0 to 0.2% gravel, 97.1 to 99.1% sand, and 3.3 to 5.3% fines with a TOC of 0.28 to 1.52%. No parameters were detected above SEF freshwater SLs. No parameters that were not detected (U) had method reporting limits (MRLs) elevated above SEF freshwater SLs.

TABLE 5. BON NL2: SEDIMENT CHEMICAL AND PHYSICAL DATA (SAMPLED 22 MARCH 2022)

Decision unit (Sample ID): Parameter	BON-NL2-COMP-1	BON-NL2-COMP-2	SEF SL1
Grain size (%)			
gravel (>2.00 mm)	0.2	0.0	--
sand (0.063 to 2.00 mm)	97.1	99.1	--
silt and clay (<0.063 mm)	5.3	3.3	--
Total organic carbon (%)	1.52	0.28	--
Total solids (%)	60.3	66.6	--
Metals (mg/kg)			
Arsenic	2.67	2.57	14
Cadmium	0.20	0.18	2.1
Chromium	12.5	11.8	72
Copper	13.7	13.3	400
Lead	9.39	8.46	360
Mercury	0.04	0.03	0.66
Nickel	13.9	14.2	26
Selenium	0.43 J	0.44 J	11
Silver	0.09 J	0.08 J	0.57
Zinc	112	108	3,200
PAHs (ug/kg)			
Naphthalene	4.6 J	20.0 U	--
Acenaphthylene	20.0 U	20.0 U	--
Acenaphthene	20.0 U	20.0 U	--
Fluorene	20.0 U	20.0 U	--
Phenanthrene	53.8	20.0 U	--
Anthracene	20.0 U	20.0 U	--
2-Methylnaphthalene	20.0 U	20.0 U	--
Fluoranthene	104	20.0 U	--
Pyrene	91.2	20.0 U	--
Benzo(a)anthracene	27.4	20.0 U	--
Chrysene	41.6	20.0 U	--
Benzo(b,j,k)fluoranthene	56.6	40.0 U	--
Benzo(a)pyrene	21.6	20.0 U	--
Indeno(1,2,3-cd)pyrene	20.0 U	20.0 U	--
Dibenzo(a,h)anthracene	20.0 U	20.0 U	--
Benzo (g,h,i) perylene	17.8 J	20.0 U	--
Total PAH's	357.4	40.0 U	17,000
Phthalates (ug/kg)			
Di-n-butylphthalate	20.0 U	20.0 U	380
Bis(2-ethylhexyl)phthalate	49.9 U	8.7 J	500
Di-n-octylphthalate	20.0 U	20.0 U	39
Phenols (ug/kg)			
Phenol	7.5 J	20.0 U	120
4-Methylphenol (p-cresol)	31.1	20.0 U	260
Pentachlorophenol	99.9 U	100 U	1,200
Miscellaneous Extractable Compounds (ug/kg)			
Benzoic acid	200 U	200 U	2,900
Carbazole	7.7 J	20.0 U	900
Dibenzofuran	20.0 U	20.0 U	200
Pesticides ug/kg)			
DDDs (2' plus 4' isomers)	1.00 U	1.00 U	310
DDEs (2' plus 4' isomers)	1.00 U	1.00 U	21

Decision unit (Sample ID): Parameter	BON-NL2-COMP-1	BON-NL2-COMP-2	SEF SL1
DDTs (2' plus 4' isomers)	1.00 U	1.00 U	100
Dieldrin	1.00 U	1.00 U	4.9
beta-Hexachlorocyclohexane	3.99 U, Y1	3.00 U, Y1	7.2
Endrin ketone	1.00 U	1.00 U	8.5
Polychlorinated Biphenyls - Aroclors (ug/kg)			
PCB-Aroclor 1016	4.0 U	4.0 U	--
PCB-Aroclor 1221	4.0 U	4.0 U	--
PCB-Aroclor 1232	4.0 U	4.0 U	--
PCB-Aroclor 1242	4.0 U	4.0 U	--
PCB-Aroclor 1248	4.0 U	4.0 U	--
PCB-Aroclor 1254	4.0 U	4.0 U	--
PCB-Aroclor 1260	4.0 U	4.0 U	--
PCB-Aroclor 1262	4.0 U	4.0 U	--
PCB-Aroclor 1268	4.0 U	4.0 U	--
Total PCBs (except 1262 and 1268)	4.0 U	4.0 U	110 (22†)
Butyltins (ug/kg)			
Monobutyltin	1.89 U	1.88 U	540
Dibutyltin	5.77 U	5.74 U	910
Tributyltin	3.86 U	3.83 U	47
Tetrabutyltin	4.99 U	4.96 U	97
Total Petroleum Hydrocarbons (mg/kg)			
Diesel range	9.54	7.08	340
Residual range	27.7	17.3	3,600

U = This analyte is not detected above the method reporting limit (MRL) or if noted, not detected above the limit of detection (LOD)/method reporting limit (MDL); J = Estimated concentration value detected between the MDL and MRL; Y1 = Raised MRL due to interference; † = ODEQ (2007) freshwater fish-based bioaccumulation screening level value (SLV)

6.0 RECOMMENDATION OF DREDGED MATERIAL SUITABILITY

Collection and evaluation of the sediment data were completed using the 2018 SEF guidance. Chemical results from the BON NL2 downstream channel sediment samples were compared to the 2018 SEF freshwater benthic toxicity SLs as applicable. In the absence of regional bioaccumulation triggers, the Corps also considered bioaccumulation SLVs published in Oregon DEQ's "Guidance for Assessing Bioaccumulative Chemicals of Concern in Sediment" (ODEQ 2007).

Based on these data results, the Corps proposes a management area rank of "low". Therefore, the BON NL2 sediments do not need to be re-characterized for 7 years in March 2029. The Corps recommends that the sediments at the BON NL2 project are suitable for unconfined aquatic disposal and unconfined, aquatic exposure per the 2018 SEF guidance without additional testing. Based on a "low" rank and the suitability of the dredge prism, the post-dredge surface would be suitable for unconfined, aquatic exposure.

7.0 REFERENCES

Northwest Regional Sediment Evaluation Team (RSET). 2018. *Sediment Evaluation Framework for the Pacific Northwest*. Prepared by the RSET agencies, May 2018, 278 pp.

Oregon Department of Environmental Quality (ODEQ). 2007. *Guidance for Assessing Bioaccumulative Chemicals of Concern in Sediment*. Published January 31, 2007; updated April 3, 2007, by the Environmental Cleanup Program, 18 pp + Appendices.

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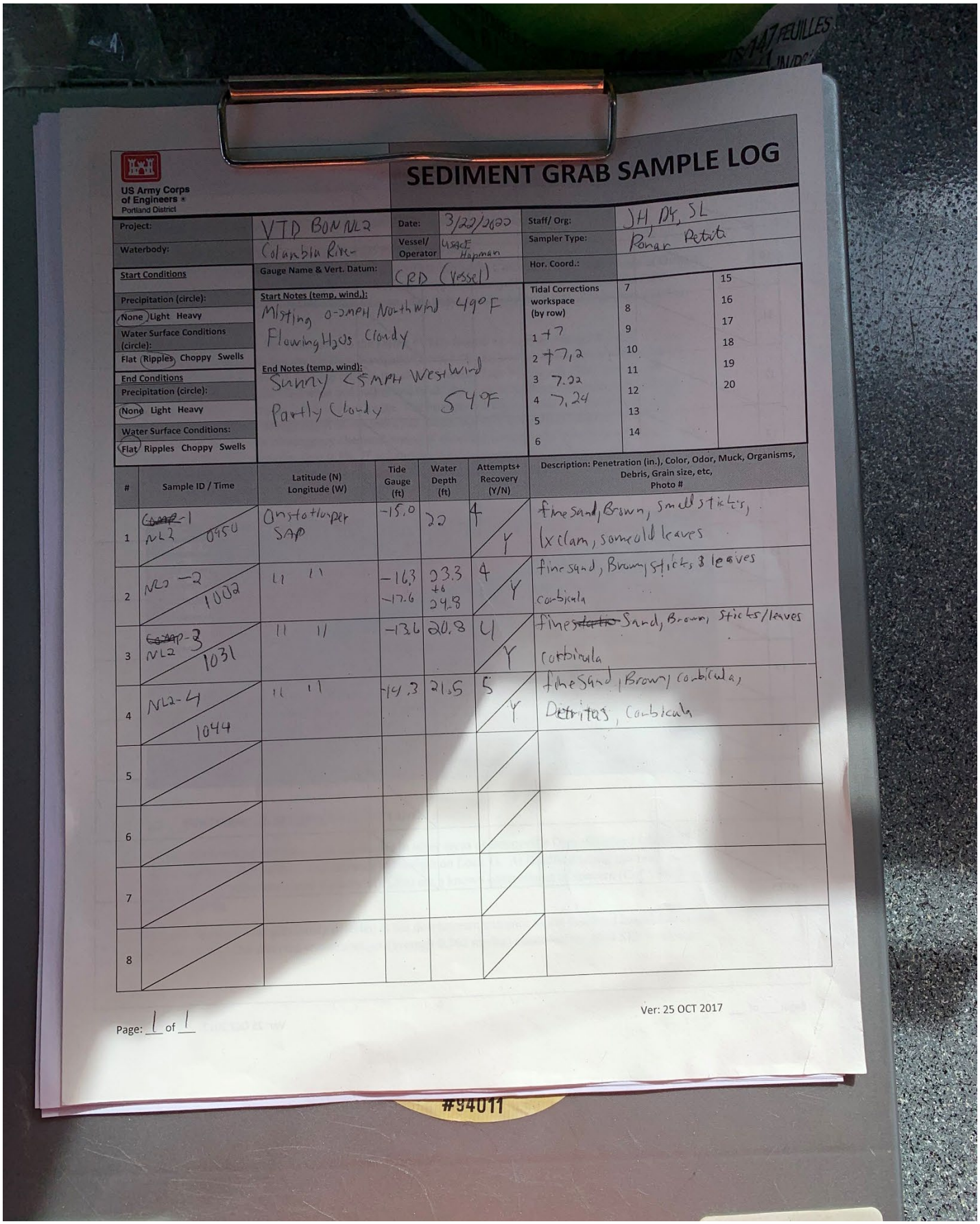
Puget Sound Estuary Program (PSEP). 1986. *Recommended Protocols for Measuring Conventional Sediment Variables in Puget Sound*, EPA and Puget Sound Water Quality Authority, March 1986 (with minor corrections: April 2003).

U.S. Army Corps of Engineers, Portland District (Corps). 2022. *Vancouver to The Dalles Federal Navigation Channel, Bonneville Dam, Navigation Lock 2 Downstream Entrance Shoal, Multnomah County, Oregon, Sediment Sampling and Analysis Plan.* Prepared by the Corps Sediment Quality Team, 2 March 2022, 12 pp.

ATTACHMENT A: BON NL2 SAMPLE LOG

(SAMPLED 22 MARCH 2022)



US Army Corps of Engineers
Portland District

SEDIMENT GRAB SAMPLE LOG

Project:	VTD BON NL2	Date:	3/22/2022	Staff/ Org:	JH, DK, SL
Waterbody:	Columbia River	Vessel/ Operator	USACE Hapman	Sampler Type:	Ponar Petite
Start Conditions		Gauge Name & Vert. Datum:	CRD (Vessel)	Hor. Coord.:	

Start Conditions
Precipitation (circle): (None) Light Heavy
Water Surface Conditions (circle): Flat (Ripples) Choppy Swells

End Conditions
Precipitation (circle): (None) Light Heavy
Water Surface Conditions: (Flat) Ripples Choppy Swells

Start Notes (temp, wind,): Misting 0-2MPH Northwind 49°F
Flowing H_2S Cloudy

End Notes (temp, wind): Sunny <5MPH Westwind
Partly Cloudy 54°F

Tidal Corrections workspace (by row)

1	+7	7	15
2	+7.2	8	16
3	7.22	9	17
4	7.24	10	18
5		11	19
6		12	20
		13	
		14	

#	Sample ID / Time	Latitude (N) Longitude (W)	Tide Gauge (ft)	Water Depth (ft)	Attempts+ Recovery (Y/N)	Description: Penetration (in.), Color, Odor, Muck, Organisms, Debris, Grain size, etc, Photo #
1	~~COMP~~-1 NL2 0950	Onstotlurper SAP	-15.0	22	4 Y	fine Sand, Brown, small sticks, 1x clam, some old leaves
2	NL2 -2 1002	" "	-16.3 -17.6	23.3 to 24.8	4 Y	fine sand, Brown, sticks & leaves corbicula
3	~~COMP~~-3 NL2 1031	" "	-13.6	20.8	4 Y	fine ~~static~~ Sand, Brown, sticks/leaves corbicula
4	NL2-4 1044	" "	-14.3	21.5	5 Y	fine Sand, Brown, corbicula, Detritas, Corbicula
5						
6						
7						
8						

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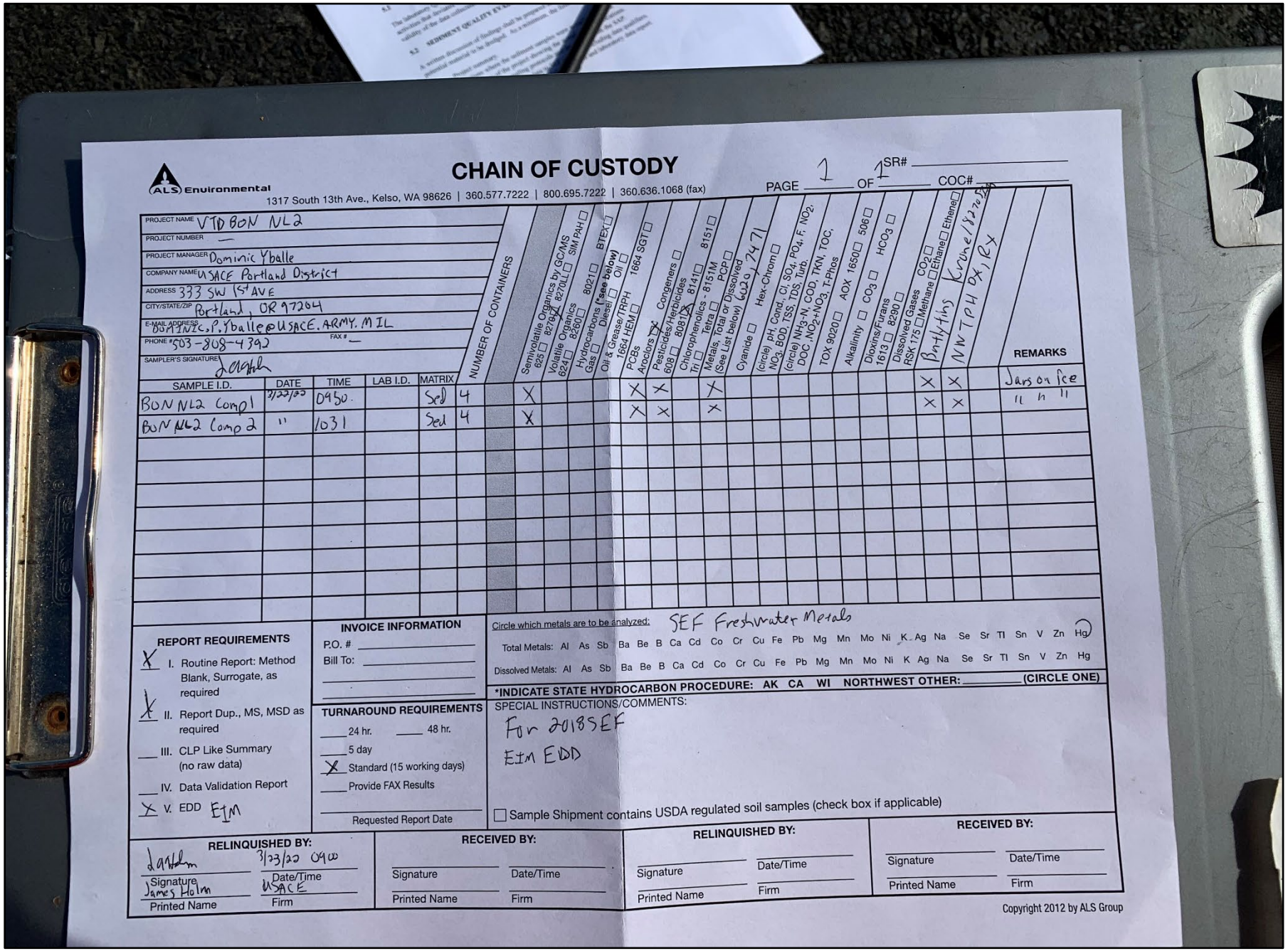
Ver: 25 OCT 2017

#94011

ATTACHMENT B: BON NL2 CHAIN OF CUSTODY FORMS

(SAMPLED 22 MARCH 2022)



CHAIN OF CUSTODY

ALS Environmental
1317 South 13th Ave., Kelso, WA 98626 | 360.577.7222 | 800.695.7222 | 360.636.1068 (fax)

PAGE 1 OF 1 SR# _____ COC# _____

PROJECT NAME: VTD BON NL2
PROJECT NUMBER: —
PROJECT MANAGER: Dominic Yballe
COMPANY NAME: USACE Portland District
ADDRESS: 333 SW 1st AVE
CITY/STATE/ZIP: Portland, OR 97204
E-MAIL ADDRESS: DOMINIC.P.YBALLE@USACE.ARMY.MIL
PHONE #: 503-808-4392 FAX #: —
SAMPLER'S SIGNATURE: [signature]

SAMPLE I.D.	DATE	TIME	LAB I.D.	MATRIX	NUMBER OF CONTAINERS	REMARKS
BON NL2 Comp1	3/22/22	0950		Sed	4	Jars on ice
BON NL2 Comp2	"	1031		Sed	4	" " "

Semivolatile Organics by GC/MS 625☐ 8270☐ | Volatile Organics 624☐ 8260☐ | Hydrocarbons (*see below) Gas☐ Diesel☐ Oil☐ | BTEX☐ | Oil & Grease/TRPH 1664 HEM☐ 1664 SGT☐ | PCBs Aroclors ☒ Congeners ☐ | Pesticides/Herbicides 608☐ 8081☐ 8141☐ 8151☐ | Chlorophenolics - 8151M Tri☐ Tetra☐ PCP☐ | Metals, Total or Dissolved (See List below) 6020, 7471 | Cyanide☐ Hex-Chrom☐ | (circle) pH, Cond., Cl, SO_4, PO_4, F, NO_2, NO_3, BOD, TSS, TDS, Turb. | (circle) NH_3-N, COD, TKN, TOC, DOC, NO_2+NO_3, T-Phos | TOX 9020☐ AOX 1650☐ 506☐ | Alkalinity ☐ CO_3☐ HCO_3☐ | Dioxins/Furans 1613☐ 8290☐ | Dissolved Gases CO_2☐ RSK 175☐ Methane☐ Ethane☐ Ethene☐ | Batlytins Krone/8270 | NWTPH Dx/Rx

Circle which metals are to be analyzed: SEF Freshwater Metals
Total Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg
Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

*INDICATE STATE HYDROCARBON PROCEDURE: AK CA WI NORTHWEST OTHER: _____ (CIRCLE ONE)

REPORT REQUIREMENTS
- X I. Routine Report: Method Blank, Surrogate, as required
- X II. Report Dup., MS, MSD as required
- ___ III. CLP Like Summary (no raw data)
- ___ IV. Data Validation Report
- X V. EDD EIM

INVOICE INFORMATION
P.O. # _____
Bill To: _____

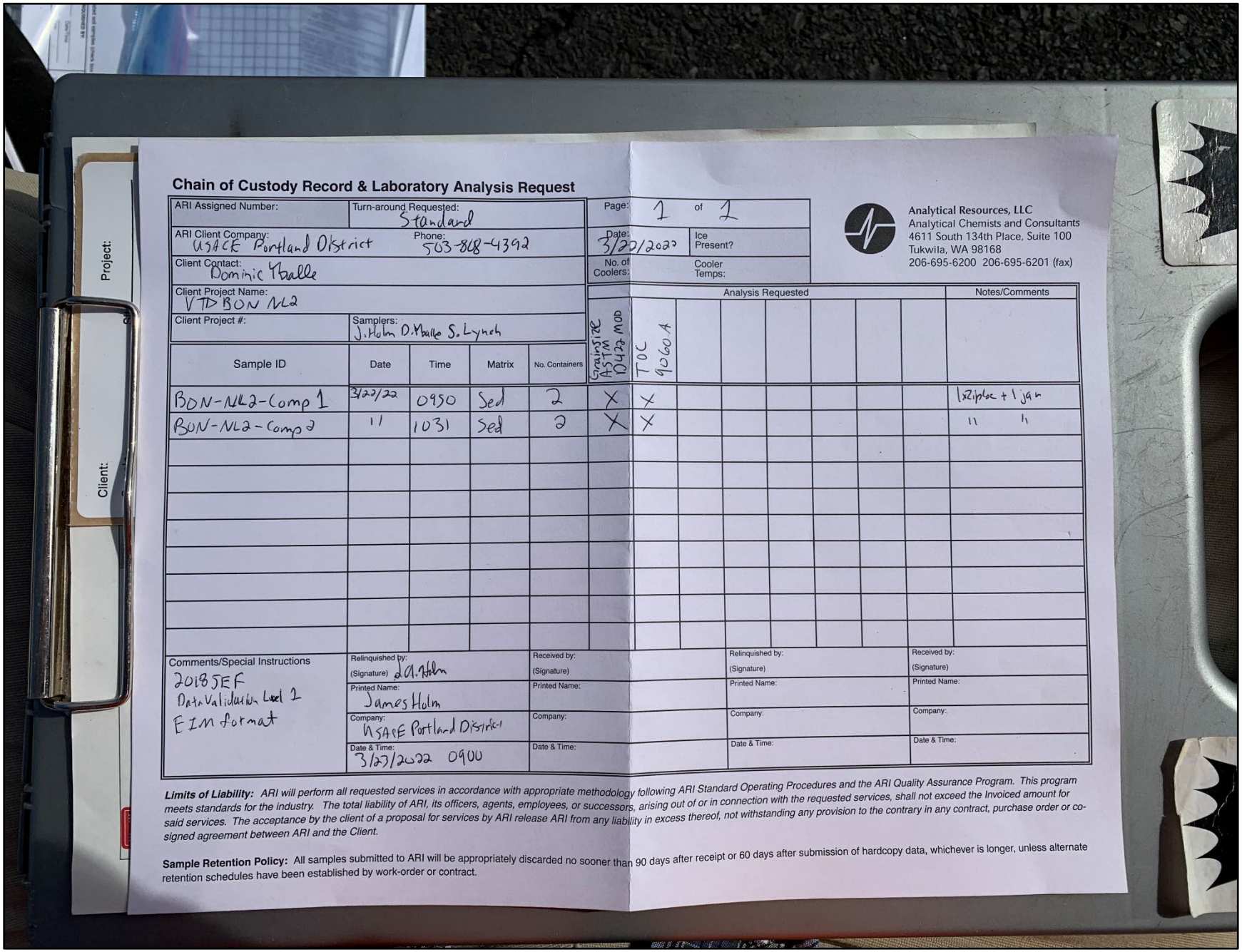
TURNAROUND REQUIREMENTS
- ___ 24 hr. ___ 48 hr.
- ___ 5 day
- X Standard (15 working days)
- ___ Provide FAX Results

Requested Report Date _____

SPECIAL INSTRUCTIONS/COMMENTS:
For 2018 SEF
EIM EDD

☐ Sample Shipment contains USDA regulated soil samples (check box if applicable)

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Signature: [signature]	Signature:	Signature:	Signature:
Printed Name: James Holm	Printed Name:	Printed Name:	Printed Name:
Firm: USACE	Firm:	Firm:	Firm:
Date/Time: 3/23/22 0900	Date/Time:	Date/Time:	Date/Time:



Chain of Custody Record & Laboratory Analysis Request

ARI Assigned Number:	Turn-around Requested: Standard	Page: 1 of 1	
ARI Client Company: USACE Portland District	Phone: 503-808-4392	Date: 3/22/2022	Ice Present?
Client Contact: Dominic Mballe		No. of Coolers:	Cooler Temps:
Client Project Name: VTD BON NL2			
Client Project #:	Samplers: J. Holm D. Mballe S. Lynch		

Analytical Resources, LLC
Analytical Chemists and Consultants
4611 South 134th Place, Suite 100
Tukwila, WA 98168
206-695-6200 206-695-6201 (fax)

Sample ID	Date	Time	Matrix	No. Containers	Analysis Requested: Grainsize ASTM D422 MOD	Analysis Requested: TOC 9060A	Notes/Comments
BON-NL2-Comp 1	3/22/22	0950	Sed	2	X	X	1xZiploc + 1 jar
BON-NL2-Comp 2	"	1031	Sed	2	X	X	" "

Comments/Special Instructions	Relinquished by: (Signature)	Printed Name:	Company:	Date & Time:	Received by: (Signature)	Printed Name:	Company:	Date & Time:	Relinquished by: (Signature)	Printed Name:	Company:	Date & Time:	Received by: (Signature)	Printed Name:	Company:	Date & Time:
2018 JEF Data Validation Level 2 EIM format	J. Holm	James Holm	USACE Portland District	3/23/2022 0900												

Limits of Liability: *ARI will perform all requested services in accordance with appropriate methodology following ARI Standard Operating Procedures and the ARI Quality Assurance Program. This program meets standards for the industry. The total liability of ARI, its officers, agents, employees, or successors, arising out of or in connection with the requested services, shall not exceed the Invoiced amount for said services. The acceptance by the client of a proposal for services by ARI release ARI from any liability in excess thereof, not withstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Client.*

Sample Retention Policy: All samples submitted to ARI will be appropriately discarded no sooner than 90 days after receipt or 60 days after submission of hardcopy data, whichever is longer, unless alternate retention schedules have been established by work-order or contract.